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. . Editorial . .

The majority of the amateurs in Australia have, no doubt, heard of the I.A.R.U.—in full, International Radio Union—but how far these amateurs appreciate the functioning of the Union is an entirely different matter. The Union goes much further than the mere awarding of W.A.C., or the printing of personal notes in Q.S.T., and the following should go far to clarify the position.

The Union consists at the moment of 26 national amateur bodies, amalgamated under the one binding constitution, to function in a manner determined by the majority of the member Societies to be in the best interests of amateur radio. The constitution provides for a Headquarters Society of the Union, but this can be changed at will by the members. The present H.Q. Society is the A.R.R.L.

Every six months a calendar is forwarded to each of the 26 National Societies, and in cases of urgency special calendars are circulated. The calendar provides "The constitutional medium for effecting international agreements between member Societies concerning the affairs of the Union." These can be divided into three phases—firstly, direct motions by members who desire the direction of the Union; secondly, the discussion centred around such motion; and thirdly, items of general interest. Concerning international amateur affairs, these two main calendars are

dated June and December of each year. This Institute is a member Society of the Union, and it is represented by the F.H.Q., at present located in Sydney, and it is left to the Federal Executive to adjudicate on matters arising out of the constitution. Included with the December reports of member Societies, and at times such calendars run to 30 pages.

It is futile to dismiss the fact that much of the hope for a successful future for amateur radio centres around the effective operation of the I.A.R.U. It will be an International Conference that may rob the amateur of his rights, and, just as logically, it will be an international body that can do most to save them. The International Technical Consulting Committee, on Radio Communications (C.C.I.R.) meets in Bucharest, Roumania, in the spring of 1937. An I.A.R.U. delegation will be there. Australian amateurs will be indirectly represented, and the Institute, together with member Societies, will be paying their share of the cost. The International Radio Regulations Conference will run in Cairo in 1938, and that is not far off when the fate of our bands, our rights and our privileges are in the balance. You are interested surely; will do your share by joining the Institute if you are not already a member; and, if you are, well—put your shoulder to the wheel and push the Institute, and indirectly the I.A.R.U. to operate for the future of your hobby.

W. M. MOORE, Federal President.

28 M.C. Transmitting Antennae

By E. H. Cox (VK3BD).

All that follows this heading has been written very largely under false pretences, and calls for some explanation. The facts are that that curious person (3ML), who rises, works schedules, and even alleges that he dresses and goes to his office before ordinary folk have settled decently in bed, called me to the telephone early one morning and, before he had thoroughly awakened me, extracted a promise to discuss 28 M.C. antennae systems.

There was a time when ostentatious youths were in the habit of boasting, upon their cards, of the thermo-couple amperes in their antennae, plainly being under the impression that an ampere, measured by a thermo-couple metre, was a unit quite superior to that recorded by the less expensive hot-wire instrument, or the even more humble moving iron meter.

The fabulous thermo-couple amp. and the 28 M.C. antennae are in a class. They are no different to ordinary amps. or ordinary aerials, and the halo in which some tend to see them is the product merely of a blurred vision, and not of some special virtue or some unusual problem of design or construction.

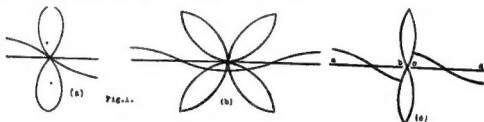
If the design of antennae systems to operate on 28 M.C. has any special interest, that interest lies in the scope which the thoroughly manageable dimensions of the basic active unit of the radiator offers for the common-sense application of the simple, known radiation characteristics of the unit to make the most of the power impressed on it. On 3.5 M.C. and 7 M.C. all too many amateur antennae are designed by the enterprising profiteer who subdivided the allotment years before. There are only two diagonals to the average back yard, and the 3.5 and 7 M.C. antennae must lie along one of them. The beginning of emancipation from this situation comes on 14 M.C., but a 14 M.C. signal gets out so well anyhow, and so many people using that band have lower frequency in-

terests also, that not very much has been done until very recently to capitalise the possibilities of considered design which the dwindling doublet length for the 14 M.C. band offers. On 28 M.C. the outlook has changed materially. On the one hand, reliable communication between any two distant points is still sufficiently difficult to maintain to make it well worth while to employ every practicable aid to communication. On the other, the convenient size of the doublet permits the erection of simple and multiple systems of high efficiency, and, where required, fairly sharp directivity even on the smallest allotment, while the shortness of a wave-length, in proportion to the masts within the reach of most people, enable the radiator or radiators to be sufficiently "in the clear" to approach, in practice, the theoretical radiation characteristics of the same wires in the mathematician's "free space." The radiation pattern of 14, 7 and 3.5 M.C. radiators supported on the masts which most people can afford is invariably modified very materially by the proximity of the ground and adjacent conductors on or in buildings. These influences are not entirely negligible on 28 M.C., but their effect is very materially reduced, and in consequence an antenna can be built on a theoretical design with considerable hopes that in operation it will behave very much as was intended.

This being so, it is imperative, at the outset, to develop at least a sketchy familiarity with the radiation characteristics of the radiators within the reach of the ordinary experimenter, and all of these can be inferred with fair clarity from the familiar figure-eight pattern of the half-wave radiator, still the favourite of so many. At this stage it may be worth pointing out that, provided that the feed to the half-wave wire is a feeder only—and in practice it never quite achieves this unity of accomplishment—the radiation pattern is quite independent of the form of feed used. It is thus possible to adopt the

convenient policy of separating problems of feeder construction from those of radiator construction and to deal with the former quite independently later. Fig. 1 (a) shows the voltage distribution and radiation pattern on a half-wave wire in a plane through the length of the wire, and this pattern, of course, is quite independent of whether the antenna is horizontal, vertical or sloped, so long as the antenna is sufficiently far from all disturbing influences to be unaffected by them.

Next to the half-wave wire, the full-wave wire is probably the most used in amateur work on all bands, and probably the full-wave or two-wave wire is more generally used on 10 metres at present than any other



form of antenna. Its characteristics are easily inferred from a consideration of the half-wave wire, as in Fig. 1 (b). Here a study of the voltage distribution on the wire clearly shows what its radiation pattern must be. On the left-hand half-wave — that between points A and B — the voltage distribution is opposite in sense to that on the right-hand half, B.C. In somewhat clumsy terms it may, therefore, be said that while AB is trying to produce the crest half of a wave, BC is trying to produce the trough half. Each half is trying to produce its radiation along the normal line to the antenna, as, in fact, the simple half-wave wire does produce its figure-eight radiation lobes. Versatile though it is, the ether so far has not quite mastered the business of sustaining in the same point two sets of waves equal in length and amplitude and exactly 180 degrees out of phase with each other. Consequently there can be no radiation along the normal line of the antenna, and the lobes which each half-wave is trying to produce are deflected outwards from each other to produce the celebrated "cloverleaf" pattern of the full-wave which Fig. 1 (b) shows.

This process of multiple-wave production can be multiplied by adding further half-wave sections to the wire. A two-wave wire produces a whole series of eight lobes, arranged round the midpoint of the wire like the petals of a daisy. It loses altogether the noticeable directive characteristics of the parent doublet, and it begins to approach an omnidirectional radiator.

Bearing in mind the fact that extensive conductors close to the antenna can modify these patterns considerably, and remembering also that "closeness" is a relative term measured in wave-lengths rather than absolute units, it becomes possible to use these patterns profitably in horizontal antenna for nearly all the amateur bands.

The horizontal doublet provides its most powerful radiation field at right angles to the line of the wire. Therefore the supports must be so placed that they lie at right angles to the line along which it is desired to radiate the most powerful signals. The "cloverleaf" pattern is one of much promise to the D.X. men, and is particularly valuable for 10-metre overseas working, provided that the aerial is suspended along the correct line. The lobes of maximum radiation are not inclined quite at 45 degrees to the line of the antenna, but they are so nearly so that the angle may be taken as 45 degrees. Hence a full-wave aerial which is built in South-eastern Australia to run either north and south or east and west will throw one good lobe along the short great circle path to London and another along the short great circle path to North America. The London lobe will take in the Dutch East Indies and Southern China. It will be sufficiently wide to put good signals into Northern India and practically the whole of Europe. The south-western lobe will serve South Africa and West Africa, and will provide good "long-path" communication to North America. The south-eastern lobe, on its way

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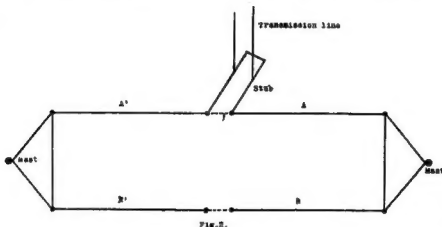


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along the long path to Europe, crosses South America from approximately the boundary of Chile and Peru to that of British and Dutch Guiana, and with its natural "spread" embraces the northern half of the South American continent. The North Island of New Zealand, Northern Africa and West Africa, Japan and the south of South America lie about the "blind" spots of such an aerial, but as these spots are not completely "blind," this fact does not rule out communication with those points altogether.

finer "beams" at right angles to the line of wires. A horizontal "beam" antenna of this type is well within the reach of most people for the 10-metre band. Four half-wave wires fit snugly between the masts, spaced to carry a horizontal doublet for the 40-metre band, and the power again, both for receiving and sending, is impressive. Unfortunately, the line of the masts must be such as to give radiation in the desired direction, and the efficiency of the arrangement for transmission in all directions is poor.



FIELD CONCENTRATION.

The full-wave wire of Fig. 1 (b) developed its multiple lobe pattern because, being a continuous wire, the two adjacent half-waves were necessarily excited out of phase with each other. Let us now break it in the middle (Fig. 1 (c)), and arrange for the two halves, AB and BC, to be excited in phase with each other. The voltage distribution curve on CD has now become the same as that on AB. Now, when AB is engaged in producing a wave crest, CD is doing the same. The result is a radiation pattern similar to that of the doublet, but with one important difference. The lobes of the figure eight are no longer nearly circular. They take the form of long ellipses. The intensity of the radiation at right angles to the wires has been greatly increased. That in all other directions has been much reduced. The pattern is showing signs of "beam" characteristics. Additional half-waves added to the ends of the system and still fed in phase with it greatly increase this tendency, and four, six or eight half-wave wires may be strung together in this way to produce very well-de-

Even a two-wire arrangement of this kind helps immensely on the 10-metre band, and it is sufficiently short to be employed on 20 metres also. Its marked advantages were proved repeatedly in a series of tests which extended all through last winter at Canberra in 20-metre 'phone experiments with the States. It was found again and again that this simple two-wire antenna invariably provided easy, positive contact with the States for voice transmission in the late mornings for several hours before not merely 'phone, but even C.W. communication could be established with the same transmitter running with the same power into a vertical doublet suspended between the same masts

REFLECTORS.

The horizontal double doublet, with the two doublets fed in phase, offers still further possibilities for practical field concentration on 28 M.C. It lends itself ideally to the use of a reflecting system. If, behind each of the two doublets, and spaced a quarter of a wave from it a reflector is hung, a further worth-while gain in field strength along the normal to the front

of the antenna is achieved. The merit of this arrangement lies in its extreme compactness, simplicity and, what is equally important when masts are not over robust, its lightness, and comparatively small wind resistance. The construction of the arrangement very closely resembles that of the old-fashioned two-wire flat top, and is indicated in Fig. 2, together with its field pattern. Two spreaders—curtain rod dowels an inch in diameter are excellent—each nine feet long, carry between one pair of extremities the two half-wave antenna (AA), and the other ends of the spreaders carry the reflectors (RR). The two antennas must be broken at their point of junction (B) by insulators, and the end of one can be four or six inches from that of the other. In the antenna pair the phasing unit must be connected in at B, to ensure that the two wires are fed in phase. This may take the form of a compact coil, but the construction of such a unit is initially difficult and tuning is troublesome. It is even more difficult to be certain that its tuning remains unaltered between extremes of weather conditions. An alternative method of effecting the phasing, which simultaneously solves the feed problem, is to terminate a pair of tuned Zepp feeder lines at B, one line being connected to the end of one antenna and the other line to the end of the other. Since the feeders are adjusted to produce a voltage loop at the point of their junction with the ends of the antenna wires, and since the currents on the two feeders are necessarily 180 degrees out of phase at such a loop, it follows that the adjacent ends of the two antennas are respectively positive and negative, and the current distribution indicated at Fig. 1 C is achieved upon them. In other words, the two antennas will be radiating in phase.

Still another method of effecting the phasing is available. It consists of joining the two antennas at B by means of a two-wire stub line closed at the bottom and one-quarter of a wave-length long. Since it is one-quarter wave long and consists of two wires, this stub in reality is a third half-wave antenna in the system. Joined to the two open antenna, it is actually excited out of phase with the pair of them when the whole system is excited, but since it is folded upon

itself the radiation which it would produce, if open, is cancelled, and its presence in the system does not disturb the normal phased field of the two open wires which it joins. Such a system is very efficient, but it must be carefully tuned. This, fortunately, is not difficult. The two antenna are strung up horizontally about 14 feet above the ground. The stub hanging from the centre of them is thus just within reach as one stands beneath the antenna. Initially it is left open. A temporary antenna is then connected to the transmitter in any convenient way, and one of its ends is brought to within a foot or so of one end of the doublet system. This temporary antenna need not be very efficient so long as its inefficiency imposes no excessive plate load on a transmitter to which it is coupled and excited at the frequency to which the double doublet is to be tuned. With the temporary antenna under load, the open end of the stub line is bridged by an adjustable jumper, carrying a pen lamp or thermo galvanometer. It is merely moved up and down the bottom of the stub until the resonance of the antenna with the field produced by the temporary antenna is achieved. An unbroken jumper, which must be exactly the same length as the temporary jumper carrying the resonance indicator, is then soldered to the resonance point, and the system is locked effectively to the desired frequency.

The reflector wires should preferably be joined by a quarter-wave stub tuned in the same way. They may, however, be cut to exact length in accordance with any of the formulae now freely available, and divided in the centre by good insulators. As erected between fixed masts, the spreaders, which are joined to the halyards by the familiar yokes of rope, hang approximately horizontal, but it is worth remembering that the optimum angle of radiation of the system in the vertical plane can be modified within limits by tilting it. This tilting is easily accomplished by attaching a strong string, soaked in paraffin wax, to each end of each spreader, and anchoring the strings to hold the antenna spreaders at the required angle, which will generally vary from time to time, and which must be determined by experiment.

As described, this system possesses the disadvantage of being markedly directive. Its power gain, however, is remarkable. Working on the 28 M.C. band at Canberra in the middle of last June, signals could neither be

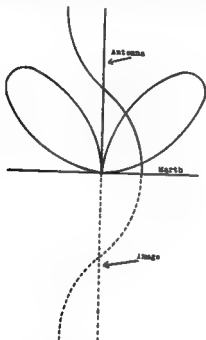


Fig. 3.

received nor sent to the United States on an open aerial. As soon as this simple little array was strung up, a flock of American code stations promptly appeared in the receiver, and the use of the antenna for transmitting permitted immediate contact, with reports never below R7 for 'phone, and often R9 for code. All this was at a time when the excellent 28 M.C. stations working in Sydney could neither hear nor be heard on open wires.

While the sharply-defined directive characters of this system are an admitted disadvantage for general working, the "flat top" of the system need only be about 35 feet long. It is, therefore, well within the dimensions in which it can be adapted to some rotating support at moderate cost in any back yard. So long as such a rotating antenna just cleared obstacles, it can be depended upon to give much superior results to an open wire in any other location.

An alternative method of overcoming the disadvantage of directivity in a fixed-wire system would be to use two systems, suspended from three

masts placed in the form of a triangle, so that the lines of the masts are respectively north-east and north-west. A right angle triangle layout of three masts, with its apex facing north, would carry a system of two antennas, either of which could be used at will to throw strong lobes to Europe and to America. If unbacked by reflectors, such a system would give an identical coverage to the full-wave wire already discussed, but with very greatly improved signal strength, and, in many cases, reduced susceptibility to interference.

VERTICAL ANTENNA.

A census of the stations operating on 28 M.C. will probably show that those employing horizontal antenna greatly outnumber those using vertical radiators. This fact, probably, is not wholly fortuitous. A clear "take off" for the 10-metre wave is of paramount importance. This is synonymous with a fairly high radiator. The mean electrical height of a vertical wire will always be less than that of a horizontal wire supported from the top of masts of equivalent height to that supporting the vertical wire. When funds are limited and masts in any case just clear surrounding objects, this extra height is well worth having. Hence probably the general tendency to superior results on a horizontal antenna on the 28 M.C. band.

Nevertheless, a vertical wire can be used to give quite good results; but, again, it is useful to understand clearly the sort of radiation pattern it is going to produce to make the most of the power radiated. The pattern in the horizontal plane presents no difficulty. Save for the modification of pattern due to guys, steel halyards and other extraneous conductors, a vertical wire radiates equally well in all directions. It is important, however, that there should be strong radiation at a very small angle to the horizontal to achieve effective refraction of the radiated wave in the ionosphere, especially at the higher frequencies. Provided it is at least half a wave-length high, a horizontal wire is always a good low-angle radiator. A vertical doublet unaffected by the earth's surface would be equally so, because the lobe of the Fig. 8 pattern would define its angle in the horizontal plane. When the doublet is placed just above the

earth, however, the lobe tends to get into trouble.

Fig. 3 is a picture to which purists may object, but which, nevertheless, gives a good idea of what happens. In Fig. 3, for radiation purposes, we pretend that the earth is a mirror. The doublet reflects itself downwards into the earth, and it reflects its field distribution pattern along the reflection of the wire as shown. Now look at Fig. 3 sideways, and note that it is a very similar product to the old familiar full-wave wire of Fig. 1 (b), with a similar "cloverleaf" pattern. It is true that the four-leaved clover has lost its two bottom leaves. The antenna does not send waves off through the earth, but what is to the point is the fact that, far from being horizontal now, the radiation on the aerial proper is tilted up at a marked angle—an angle a little too great to give optimum refraction from the ionosphere. This situation can be corrected by several expedients. One is to increase the height of the vertical doublet to minimise the effects of earth reflection.

More progress towards one's objective can be expected in this way on the 28 M.C. band than when using the longer waves of the lower frequencies. A better solution, however, consists of putting up a double doublet of the Fig. 1 C type. With such a radiator, the influence of each wire on the other will be considerably stronger than that of the earth on either. The latter factor will, however, not be wholly negligible. The resultant lobe will still be elevated a few degrees, but it will be well within the limits required for good refraction. There is some disadvantage in using this system. A radiation which is confined within a very narrow angle in the vertical plane tends to be much more subject to fading than one effected over a fairly wide vertical angle. Communication with such a radiator may thus be expected to be less consistent than when a single vertical wire is used or when radiation is from a horizontal wire. Signal intensity at peaks, or under good conditions, will, however, be greater than that to be expected from the single vertical half-wave wire.

Both in its simple and multiple form the vertical wire is well adapted

for directive types of radiation on 10 metres. As most conveniently used, directive antennas of this type depend on the fact that the radiations from two vertical wires, spaced half a wavelength apart and excited in phase, cancel along the plane through the wires, and are in phase along the normal to that plane. Strong lobes are thus radiated at right angles to the feeder line joining the two wires at their base, and either lobe may be augmented by installing vertical reflectors one-quarter of a wavelength behind the wires. Similarly, the number of elements in the system may be increased far beyond two if space permits with a corresponding narrowing and elongation of the lobes of radiation normal to the plane of the wires.

Probably the chief advantage of a "directive" antenna of the multiple vertical type is the fact that it more readily lends itself to arrangement in a rotating "beam" than the horizontal type, discussed earlier. This is because in a four-wire system a rotating frame, extending less than nine feet on either side of the supporting bearing, is sufficient if the wires be arranged vertically. For the horizontal director, the supporting frame would need extend more than 17 feet on either side of the bearing support. On the other hand, for a given height of mast, the electrical height of a given vertical system would be considerably less than that of the horizontal system, and a marked loss of efficiency would probably result in the average congested amateur position.

FEEDER SYSTEMS.

Any of the feeders which can be employed on the lower frequencies, except, possibly, the direct feed of the Marconi type antenna, work well on 10 metres. A system of feed in which the radiator is connected more or less directly to the tank of the transmitter, of course, can be used on the higher frequency bands, but it has the marked disadvantage of radiating a great deal of the energy impressed on it into a sphere in which that energy has no hope of travelling further than the adjacent clothes lines or broadcast listeners' receivers. A non-radiating feeder system to an antenna well elevated above trouble therefore becomes imperative. And at this point one imperative point must be im-

pressed. An effective feeder system is substantially non-radiating. To be so, it must be symmetrical. Symmetry, after all, is a relative term. One side of a Zepp feeder operating on 80 metres can be a little longer than the other without seriously affecting the operation of the system. The disparity is easily balanced on the feeder tuner. On 10 metres, the effect of this unbalance in the same line is eight times greater. It may represent, in terms of wave-lengths, something approaching a quarter-wave. The task of correcting such a discrepancy becomes then a somewhat formidable one for the line tuner. Hence it is that scrupulous care is necessary in building any two-wire line for 10-metre operation to see that the line is cut, assembled and hung in a truly symmetrical manner. The great majority of feed and feeder balancing troubles on the higher frequencies probably arise from lack of attention to this important point.

As on other bands, the old, familiar Zepp feed line is probably the simplest to get working on 10 metres, and if properly adjusted it gives excellent results. It has the great merit of not limiting the operator to one frequency, because minor discrepancies in the antenna length can be reasonably adjusted on the tuner. It must be remembered, however, that discrepancies of a minor nature on the higher wave bands, for the reason just mentioned, become major on 10 metres. Considerable scope of tuning adjustment exists on a half-wave 10-metre wire operated on 10 metres by a Zepp feeder. Not nearly the same flexibility of wave-length adjustment can be expected on a half-wave 40 or 80-metre wire, because each additional half-wave on the wire multiplies the difference between its length and that to which it should be cut for operation on 10 metres.

A number of factors contribute to make some form of matched impedance feed to the antenna preferable to the resonant Zepp feed on 10 metres. In the first place, since the interference problem on the 28 M.C. band is immeasurably less than that anywhere else, the ability to change frequency easily is no longer of prime importance. A matched impedance-fed aerial, once erected, can only be retuned with wire cutters or a solder-

ing iron. The outstanding merit of a matched impedance feed is the fact that it is very much more efficient than a resonant line, especially when its length, relative to the length of the wave being employed, is considerable. The average 40-foot Zepp line is only a little over a quarter of a wave long on 40 metres. On 10 metres its length is nearly that of one and a half waves. Every half-wave produced on a resonant two-wire line is represented by two voltage loops and two voltage nodes, one on each wire. At the voltage loops the current is high. It tends to break over the separating insulators. The problem of procuring a good dielectric substance, not affected by weather, especially for use on the high frequencies, is so well known that the virtue of avoiding extreme high-frequency voltages at half-a-dozen or more points on a line is obvious. In the same way, every voltage node is a current loop. The high-frequency current at such a point reaches a high value. The power loss due to the pure resistance of the conductor reaches a value which is proportional to the square of the current value. When such points are repeated at intervals along the line half-a-dozen or more times, the aggregate loss is worth considering. These extremes, either of voltage or current, do not occur on the matched impedance feed line. Ideally, the voltage and the current are both uniform throughout the length of the line. Actually, they never are so, but careful mechanical construction and careful tuning can reduce standing waves on the line to a negligible minimum.

The matched impedance line has a further advantage. The current in a spaced line is never likely to approach an intensity of one ampere, when conveying the power output available in the amateur station. A heavy conductor is, therefore, not necessary to prevent excessive C^2R losses. The aerial proper may perhaps be of No. 12 or No. 14 gauge wire, but in any ordinary installation No. 18 will be sufficiently heavy for the feed line. This fact saves money, and, what is probably even more important, it assists in the achievement of symmetry. The thin line hangs straighter and more cleanly than the heavy wire of the aerial proper.

The quarter-wave stub line is becoming increasingly popular as a means of coupling the matched impedance line to amateur antennas. Therefore, let us get to know about the quarter-wave stub. As a coupling, medium, pure and simple, its claim to favour lies rather in its convenience than in any special intrinsic efficiency. After all, it has a certain amount of resistance, and it contains one voltage node. Therefore, it dissipates a certain amount of power in pure resistance loss, even if it does not radiate. From that point of view, it is much better out of the antenna if its use can be avoided.

The alternative to the stub for joining the line to the antenna is the familiar delta fan—an admirable arrangement if the house and allotment are built to fit the masts, rather than the masts being built to fit the antenna. The trouble with the delta fan is that it is very temperamental. It works well only so long as it is built metriculously to specification. The feeders must fan uniformly, dimensions must be right, and the feed must approach an exact right angle to the antenna. Standing waves on the line, as husky as any on a resonant line, are the penalty for neglect of these requirements.

In a pair of phased wires such as the horizontal beam already described, a stub is employed for phasing purposes any way, so why not use it for coupling, too? Double up the doublet with delta feed, and it becomes a stub with a matched impedance line, terminating towards the closed end. The terminating point for good impedance match, on a stub for 28 M.C., will lie somewhere between 18 inches and 24 inches from the closed end of the stub, according to the spacing of the wires and the gauge of wire used in the transmission line. This point can be found initially by a pea lamp connected across the bottom of the stub while the antenna is excited over the line, and more precisely by testing the line for standing waves with a Neon lamp or other indicator. After all, it is current in the antenna which really counts, and if the line is adjusted for maximum antenna current, precise line adjustment is not of first-rate importance in the absence of manifest evidence that it is working imperfectly.

The stub method of feed is not useful for the two-wave beam only. A stub may be connected on to one of any type of tuned aerial, the second line of the stub being left free. Then it merely becomes the last quarter-wave of a tuned Zepp line, which may be conveniently regarded as transformer fed from the line through a transformer, the secondary of which is the whole stub and the primary that part of the stub subtended by the two feeders about the closed end. This form of feed has the advantage of permitting the feed line to be drawn away at almost any angle from the aerial, so long as the line does not pass close under the aerial without serious danger of the creation of standing waves by reflections set up by the field of the aerial. It has the further advantage of enabling the aerial to be conveniently and precisely tuned by adjustment of the jumper at the bottom of the stub by the method already outlined. In short, it combined many of the advantages of the Zepp system with many of those of the matched impedance system, and eliminates a lot of the troubles of each.

The matched impedance feed line can be coupled to the tank of the transmitter by a Collins coupler. A flexible method of matching impedance, as well as a convenient way of varying the antenna load on the tank is thus provided. The system, however, is not without its losses, and on 28 M.C. these tend to vary about inversely with the amount of money one is prepared to spend on condensers and dielectrics for the coupler. A good alternative is to couple a tuned tank to the transmitter tank and to clip the ends of the transmission line on to this tank across a section of the coil, of which the impedance is equal to the impedance of the line. This condition of impedance match is indicated by a minimum of disturbance of the tuning of the tank when the line is connected to the tank. A useful method of coupling, not by any means free from the evils of standing wave production, and therefore not recommended for permanent use, which is nevertheless sometimes a help in preliminary adjustments, consists of the connection of the ends of the transmission line across a coil of about two turns, which, while untuned, is

fairly closely coupled to the transmitter tank. The size and spacing of the turns must be determined by experiment to give an approximate impedance match with that of the line.

Those who favoured the twisted pair type of matched impedance feed should note that this system is quite adaptable to the stub line as a final feeder unit or as a phase changer. When twisted pair feed is to be used, its association with a stub is really only worth while when the stub has to be inserted in the antenna for the purpose of phasing, as in the two-wire directive system. Here the feed from the twisted pair line should be into the stub, rather than into either of the open antenna, for the purpose of effecting precise balance of load in the two half-waves of the radiator. The jumper bar of the stub corresponds with the centre of a half-wave wire, and a two-wire twisted line connected across the ends of the stub in place of the jumper, by which these ends would otherwise be closed, is working into an impedance approximately equal to its characteristic impedance, and therefore gives a good power transfer into the system at this point.

RARE LINES OFFERED.

Editor, "Amateur Radio."

Sir.—On perusing the advertisements in our March issue, I noticed that Traveltone Radio, of Bourke-street, are offering Westron Ferranti Meters, which is a new one on me. Seems to be a colorable imitation. Also are offering Special Pair Transformers. I was unaware that they are born as twins. I congratulate Traveltone Radio on their introduction of interesting novelties.—Yours, etc.,

SIMPLE SIMON HAM.
PKOZO.

[Note.—The comp. has been placed in the lethal chamber.—Ed. A.R.]

NEW FACTORY FOR SYDNEY.

Crompton-Parkinson Ltd., England, has decided to establish a branch of its works in Sydney, where it is expected that the company will be manufacturing electric lamps by the end of the year. The decision follows a visit to Australia by Mr. Frank Parkinson.

Federal and Victorian QSL Bureau

By VK3RJ (Federal QSL Manager).

Enfrants in the recent B.E.R.U. contests are reminded that logs must be in the hands of the R.S.G.B. not later than 30th April. Log forms may be obtained at the above bureau.

Hans Bauer (D4ARR), ex-D4UAN and D4BAR, and an active experimenter over the last six years, has met with astonishing and well-deserved success in his 28 M.C. work. Hans has contacted no fewer than 50 countries on this frequency.

Our old friend, Charles Gaveau (F7CGV), now signs FK8AA. Charles is a photographer and is located at Noumea, New Caledonia.

QSL managers view with dismay the issue of three-letter call-signs to VK stations. While recognising that two-letter calls must, sooner or later, become exhausted, we trust it will be some years before other States are forced to follow the example of VK2.

At the moment of writing, we are in the throes of ARRL D.X. Contest, and the customary bedlam on 7 and 14 M.C. bands. VK stations seem to be doing particularly well, except when OA4J and HJ3AJH are on. VK2EO and VK2LZ are performing well, the latter reaping a harvest on 28 M.C.

Cards are on hand at last from VK4JX, ex 7JK and 3JF. Guess you will have a job to pick up arcaez. Jack. Congrats. on the interesting cartoon depicted on your wallpaper.

Another delinquent with cards is HJ3AJH, one of whose qsl's we are yet to see. Many VK's anxiously await his card for W.A.C., the most anxious being Jim Austin (VK6SA), the first station to ever W.A.C. from Western Australia. My personal congratulations on this achievement, Jim!

Cards are on hand at this bureau for the following VK3's (postage will ensure their despatch):—3AH, AN, AP, AX, AY, BE, BJ, BR, BX, CA, CV, DG, ET, FC, FM, FT, FZ, GA, GE, GM, GY, HE, IL, JL, JR, JZ, JK, KB, KD, KM, KS, KT, LK, LS, MK, MX, NA, NG, NJ, NN, OB, OI, OK, OP, OZ, PC, PH, PL, QY, RE, RM, RZ, SL, TC, UJ, UY, VF, VK, WC, WX, XF, XK, YL, ZA, ZF, ZW, ZX.

Obituary

It is with deep regret that we have to announce the passing of two of the A.R.R.L.'s oldest and most notable members. The first, Hiram Percy Maxim, W1AW, President of the A.R.R.L., and, secondly, C. H. Stewart, W3ZS, Vice-President of the A.R.R.L. Both Mr. Maxim and Mr. Stewart were so well known in the amateur radio field that to say much about their activities would be superfluous.

H. P. Maxim was the inspiration and residing genius of A.R.R.L. from its beginning throughout its entire existence, more than a score of years. Its founder, who conceived the organisation while relaying a message in the early days, he personally worked in the writing and mailing of A.R.R.L. bulletins and the official organ until A.R.R.L. grew beyond his expectations. He worked tirelessly in defence of amateur rights, and in the leadership of the affairs of all amateurs united in our A.R.R.L., and likewise became president of the International Amateur Radio Union. The president was nationally and internationally distinguished in the fields of science and invention. We cannot begin to recite his influence and his accomplishments. A man of character, with high principles, as well as being remembered as a spokesman for amateur rights, constantly mindful of the general amateur welfare, his human qualities, his personal example, his consummate tact and good sense won the affection and confidence of all.

C. H. Stewart was Vice-President of your A.R.R.L., and a member of the A.R.R.L.'s Board of Directors for fourteen years. He was manager of the Atlantic Division from 1921 to 1925, and held many other important posts. Most notable was his work in the field of radio legislation in which he was an expert. His legislative work started in 1908, a few years before the founding of A.R.R.L.

Mr. Stewart worked through his whole life for the defence of the rights of radio amateurs, and to make amateur rights into enduring radio laws for the protection of the amateur. With Mr. Maxim, he gave much time and energy to the building of the foundations on which our present-day amateur radio stands.

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R.A.A.F. Wireless Reserve Notes

Federal Notes by the O/C., 1A1-3ML.

March was the month of rejoicing for Reserve members, and it was all over the issuing of crystals to all by the Air Board. From one to two crystals have been issued to every active member, thus putting him on definite R.A.A.F. allotted frequencies. The bugbears of interference from stations of all kinds will be overcome and together with everyone being on a fixed and known frequency, should offer far more satisfactory working all round. Training and organisation will be altered slightly to provide for the new conditions.

Many ideas of competitive training now present themselves, such as rapid answering of calls; collective, general and otherwise. Punctuality on watches will be necessary if smooth running is to be expected.

The "Bulletin" this month has been delayed a while in order to insert certain important articles, but should be posted about the 31st. Six new members will have been enrolled by the time these notes are printed, and represent a general increase of enthusiasm in nearly all districts.

Right from its inception the Reserve has always suffered from the difficulties of communication between centres throughout the year. A plan is being constructed with the aid of a map with all members pin-pointed on it in order to see whether an entirely different zoning scheme could be brought about that would place members within reliable communication with others. This would mean probably totally disregarding the State boundaries as now exist and drawing of flexible zone areas as required. VMG would possibly be absorbed by VMC under the new scheme, and so with southern VMB.

THIRD DISTRICT.

By 3Z1-VK3UK.

At long last! After some months of hopeful anticipation, our crystals have arrived. After having checked through a dozen, it is no exaggeration to say they more than come up to

expectations. In a way, although it is now quite inadequate, we will be sorry to see our old allocated frequency system go, because it has served us admirably for over two years. We are still going to use these old frequencies for general yarning after schedules. We must pay a tribute now, as we pass to our new organisation, to Max Howden, and also Ivan Hodder, for their wonderful work in providing free, crystals for every member of VMC, ground to allocation. It is obvious that it would have been impossible to have achieved anything we have without their wonderful help. Every station was 14 K.C. away from his neighbour, thus each section occupied 84 K.C.; it sounded good and was a good system with the exception that the D/C. certainly had some dial twisting to do on each schedule in monitoring 504 K.C. continuously!

This is the time of the year when most country men take their holidays, and, as a result, we have had the pleasure of seeing quite a number of VMC country men this month.

3C1 made a flying week-end visit a fortnight ago, but unfortunately we had very little time for a yarn. 8A6, another of our Shepparton men, was down in the same week and had more time. Dud was able to spare a night to come out to 3Z1 and hear the new nine-tube S.S. Super. Dud has been very off colour of late, but is looking much better now.

3B1 is away touring Victoria again. We had a long yarn to him from 3C5's the other night. Leon must have latent talent as a long-distance runner, as when 3Z1 contacted 3C5, the latter station rang through to where Leon was staying in the town, and Leon arrived in the shack from nearly a mile distance by the second "over"! He will be passing through Shepparton on his way back, and we can imagine the night he will spend there!

We have recommenced metropolitan station meetings, and the first passed off very successfully and some excellent new ideas have resulted. We are also holding a regular fortnightly

Amateur Radio

luncheon to which all the metropolitan men have been able to get along. It is marvellous how easily new ideas come forth and are amplified into whole schemes over a cup of coffee.

3D4 was hoping to get down for the last one, but arrived in the city just half an hour too late.

3C8 has now returned and took 3Z2 part of the way with him. 3Z2 is still extra busy, but we are hoping he will be able to be back on regular schedule shortly.

8B3 is back on the job again after his holiday at Queenscliff. A schedule never seems the same when the real old-timers are away. They never miss except when on holidays or through illness.

VMC1 will be missing another of its old-timers for the next two weeks when 3A5 will be away on holidays at Lorne. Gordon was able to hear the working of a schedule from the D/C's end for the first time as he came out for last Sunday's work. It is most interesting to hear the work from the other end sometimes.

3D2 will be going on a motor tour into N.S.W. this week also, and so, for the first time in what must be over five years, Coleraine won't be represented on a schedule.

All VMC and other district members will be delighted to hear of the recent successes of two of our old members: Ex-3C4 Dalziel has just passed his Commercial Operator's Ticket, and Ex-3E3 Phillips has just got his Pilot's Licence.

SIXTH DISTRICT.

By 6Z1—6MN.

There is not much to report from this district for the past month. By the time these notes are printed the

crystals should be in the hands of all active members. 6A6 is building a new rig and is anxiously waiting for cool weather so that the local ice works will not be working when he is trying to keep watches on Sundays.

6B1, with his FBXA receiver, does not worry about motors or other devices for causing interference. We are glad 5A2 is back on the air again and the link 6B1, 5A2 and VMC is working once again. 6A3 keeps watches but no other news. 6A2 busted his pet crystal last Sunday, and so the Reserve ones arrived conveniently. 6A1, 6Z2 and 6Z1 can be heard chasing W.A.C. on 28 m.c., and living in hopes. 6A1 had a great time at the Reservists' camp held at Northam. Unfortunately 6Z2 was unable to attend as arranged.

6SA W.A.C. ON 28 M.C.

The first VK6 W.A.C. was obtained on 7th March, 1936, by 6SA, after a period of 15 years, and a few particulars of the gear used are given:—

The transmitter is as follows:—

46 c.o., 80 m.x.; 46 bfr, 80 m.x.; 46 freq. doub., 40 meters; 46 freq. doub., 20 metres; 46 freq. doub., 10 meters; 46 Push-pull final amp., 46 Push-pull final amp., 80-foot antenna; horizontal, with single-wire feed.

6SA worked HJ3AJH on Saturday, 7th March; Sunday, 8th March, and Monday, 9th March, and was reported qsa 4, R4/5. 6SA gave HJ3 the same report, and HJ3AJH reported the 6SA was the second VK6 he had heard in 15 years. He heard the other VK6 (forgotten) when in Costa Rica under the call of TI3LA. W.A.C. was made in 21 hours, but he hopes to improve that time very soon. Hi!

A list of D.X. qsoed on ten is under:—J, G, EI, F, D, OH, ON, YM, PA, SM, OK, U, VU, W6, W8, ZS, SU, FA, HJ, ZL, VK2-6, PK.

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Divisional Notes

Divisional Addresses :-

NEW SOUTH WALES	BOX 2127L, G.P.O., SYDNEY
VICTORIA	BOX 2611W, G.P.O., MELBOURNE
QUEENSLAND	BOX 1524V, G.P.O., BRISBANE
SOUTH AUSTRALIA	BOX 284D, G.P.O., ADELAIDE
WEST AUSTRALIA	62 SUBIACO ROAD, SUBIACO
TASMANIA	BOX 547E, G.P.O., HOBART

N.S.W. Division

February 29th saw another year passed since the reorganisation of the Wireless Institute in this State, and with a nett gain of some 40 new members during the past year the position of the Institute in N.S.W. is very strong.

The Council feels quite sure that the coming year will even be one of greater growth. Unfortunately, with this event, this division loses quite a number of old faces from the Council. The first was the Secretary (Bob Power) late last year, and now, with the ballot being taken, the President (Frank Goyen) and J. O'Dean have announced their inability to continue. 2UX has the one and only President since the reorganisation in 1931, and his absence from the chair will be a decided loss.

Judging from the ballot paper that has been distributed, we will see quite a few new faces on the N.S.W. Council.

The annual elections here comprise, firstly, the distribution of a nomination paper by post, and then finally the ballot giving country members the same rights as city members in the election. The results of the ballot are then announced at the Annual General Meeting.

There have been complaints of the non-publication of publicity notes from New South Wales at times during the last few months. We can assure those concerned that the notes go down to Melbourne, but owing to special features appearing in the magazine at times to time, the Editors have deemed it necessary to cut same on occasions. However, a decided change will be made, starting from the May issue, in the presentation of notes, etc. It will be the aim to arrange as much as possible into a small space. Personal notes will be short and breezy. The names and addresses of the zone officers will be published at the head of the notes each month.

Exhibition arrangements are just being finalised for an all-amateur State-wide Exhibition, around the end of June. Everyone is asked to keep that in view and, when rebuilding, think of the forthcoming exhibition. The final rules, dates and times will be announced in the May issue of this magazine. If anyone is so interested, that information will be available from the Secretary from 1st April onwards. Anyway, direct publicity will be the order in this State.

Two members, in 2BW and 2JA, have been visiting Sydney. 2BW saw many of the outfits, but 2JA was handicapped with a YL.

NORTH SHORE ZONE.

2AE's 25 watts in the junior BERU sounded like 250. However, an antenna of 85 feet high was responsible.

The northern ham, 2DR, is still YL-ing.

At Roseville, 2NN, 2SV and 2ZH all fill the air with 'phone at odd moments.

The North Shore lost 2AH recently, when he sailed for England to have a look round at radio on the other side. His brother, 2EE, will shortly be up holding the family D.X. traditions.

2BJ's space for antennas is unlimited with 80-foot gum trees ad lib.

Crystal has claimed 2SS and his. From now on he can really claim the T9's he used to get with the P.P. 45's.

2PV, with two crystals, shoots up and down to 40 M.X.

2AG still survives with many 46's, and 2PP asks for budding steeplejacks to paint his pole.

2EO arrived D.X., and all from Enmore to Chatswood as acquisition. Not exactly; he is on too much. His new QRA, the 80 D.X. countries, is still going up, and that speaks for itself.

2YC, 2LZ and 2HZ are all contest cranks and after both BERU tests. The latter two are trying the Yanks.

2HY is quiet, and 2DU (next door) has not been heard for years.

Old 2JE, of Cremorne, can be heard as 4LI, as usual, on 'phone.

2EL made a come-back. 6A6 driving push-pull. 80Z's W.A.C. on 18 watts in two weeks' test from 2DA. That efficiency!

While on efficiency, heard the other day that these metal chassis rigs were generally 50 per cent. efficient; that the 50 per cent. is down the sink (with exceptions).

2QF, with a new Baby Ford, excited comment.

2IP and 2WW are rather quiet QRL.

2VE and 2VG are active. 2VE on grid bias 'phone.

WESTERN SUBURBS NOTES.

(By 2MY.)

Our sympathy to Charlie Richardson (2PT) on the illness of Mrs. Richardson, and we all trust that she will soon be on the road to health again.

Congratulations to 2GR upon the arrival of a new operator. Understand he is to take the Crooning Session on the B.C.L. Band.

2MQ let his call lie in Chancery for six months and then had it swiped. Now labours under "Alphabetical Boy Friend," or some such affliction.

2HR rebuilt rig. Now using 53 Osc., 2A5 and pair of 801's in final. Spent his holiday touring. Visited 2PF and 2TV at Cowra; also Trevor, of 2NS, at Bathurst. Sez sure a F.B. gang of chaps!

2MY anxiously searching for a South African YL fer W.A.C. YL. Hi!

2WD (Bill Dukes) and 2PY (Ralph Nancarrow) too qrl building transmitters at A.W.A. to take much interest in Hamdom, but Ralph has designs on a ten-tube panel es rack job shortly.

2UY (Harry) sure gets out with a F.B. T9 signal. Counted seven Yanks at top of the band calling him the other night.

And then there is the tale of the newest recruit to the Pirates, who, after much haggling at Paddy's Markets, bought a defunct 10-amp. Tungar charger bulb, worth nothing, for 5/-, and gleefully confided to his second operator that these dealers "don't know a 50-watter when they see it."

2FD grinds 40 M.X. crystals 'tween intervals of 'phone. Gets nice reports from ZL—one in particular.

2FO lands plenty Yanks on 40 with a pair of 46's in final stage, but missed a VE the other night. Bad luck, Tom!

VS4CS expects to be in VK2 on leave shortly, and hopes to personally qso some of his D.X. contacts.

2MW now only wants South Africa for W.A.C. Heard him try his Spanish out on OA-4-AA.

2IC. — Condolences to "Clarkie." Left his brand new SSS on the table near an open window. "Rain" flooded super; power switched on; super's tummy boiled; no super. Bad luck OM!

Another ham returned to the fold—2GJ. Now at new qra in Bondi. Reports Yanks easier to work than on North Shore. But, oh, that 'phone qrm!

Interesting to note that in these days of big tubes 2PX, 2IC and 2JT—three of our best D.X. merchants—all

use a single '10 in the final, with about 400 volts on the plate.

3YO (A. R. Jany) wants to watch out. Some VK2 will be selling him the G.P.O. clock tower at a rating of 2 watts.

Victorian Division

PHONE SECTION NOTES

At the February meeting of this Section the main feature took the form of a complete resume by the Chairman (3TH) of his tour through New Zealand. Mr. Thompson paid a holiday visit to New Zealand at Christmas time with a view to getting away from the every-day things of life (radio included). According to the amount of time spent at the various D.X. club meetings, one is led to believe that good old radio did not take the back position which it was intended to get.

The meetings over there are apparently very well attended by a large band of enthusiastic supporters, who seem to consider it essential to have on hand always "bottles of supper" of a vintage outstanding in strength. Ask 3TH.

Most D.X. club meetings assume more or less the same system of procedure. The best verification for the month is chosen by the process of elimination, taking into account power of the station, on which the report was made and verified; its distance in miles from the receiver, and perhaps a consideration for the time at which the listening was done. Then, in some cases, a prize is awarded or a ladder of merit is altered to accommodate the leaders in their correct sequence.

Altogether from the report, we are agreed that 3TH had a thoroughly enjoyable trip, and if the same royal treatment is bestowed upon all visitors from VK3 to New Zealand, it would undoubtedly be a fine place to holiday.

The rest of the meeting was the usual procedure — allocation, discussions on late runners in sessions, and a report from the Allocations Committee Chairman (Mr. Kerley) re various rule breakers.

We regret to hear from 3BT (Mr. G. Bathold) that, owing to his position in business, where sufficient time can-

not be given to radio, he finds that he will have to give up his 200 M.X. transmissions. This, of course, means that B.T. will not be able to return to the band at a later date, if he finds it convenient, owing to the latest development in the regulations.

However, Geoff. assures me that he will commence work again as soon as business will allow, his attentions being directed to 5 M.X. 'phone. Let it be soon, Geoff.! Things are quiet down there.

3BH has been reminding us constantly of his presence. His signal from Mornington is received very well in Melbourne.

3HF was heard experimenting with an electrostatic microphone on a couple of Monday mornings from 0000—on.

3LM had a mandolin player there on a recent Sunday evening with one of these modern attachments whereby the sounds from the instrument are picked up directly and fed to the speech amplifier system without a microphone. This gadget functions on the principle of the Piezo Astatic Microphone.

I believe 3FW is without a receiver at present for 200 M.X. Has planned something on really superb lines which ought to eclipse all predecessors.

3TM was heard recently disturbing the ether with a mouth organ band (or parts thereof) in the early hours of the morning.

On Sunday evening, 15th March, 3BY had on hand a bunch of imported recordings of outstanding merit. The music was being enjoyed by all and sundry, and by 11.40 p.m. BY was to be heard as rebroadcast through 3FL, 3HF and 3DH.

It is with very great sorrow that we record the passing of an old-time 'phone man, 3CY (Arthur Burman), who had been ill for some time. We extend to his family feelings of deepest sympathy from the W.I.A.

KEY NOTES.

By VK3YO.

The details were received at the March meeting of a new tube from the A.W.A. Valve Co. The tube is known as the 6P6 and is similar in operation to the 802. It is suitable for operation as a crystal on E.C. oscillator, as a double and also as a suppressor grid modulated amplifier.

The tube looks somewhat like a 42 and plugs into a standard socket.

It seems to be the answer to the "hams'" prayer, particularly as the price is less than half that of the 802.

A report was made that the Dominican Amateurs were prohibited by a government proclamation from working VK's, although no reason has yet been given.

One heartening note in the month's news is that VQ8AB has advised via VK3RX that he has been out of QSL cards, but is having a big batch printed and will be forwarding approximately 120 cards to VK amateurs through the QSL bureau.

Someone has suggested that the P.M.G. be asked to shift the frequency of VK5DI right under that of JNJ.

A certain amateur wishes to know what is to be done when a crystal is purchased that has two peaks.

A suggestion was made that he was fortunate he was not asked to pay double price.

The American test is just over, and the DX bands have gone flat, with most of the DX hounds in their kennels or sleeping at their office desks.

It is to be regretted that at least ten VK2 phone stations did not have sufficient sporting instincts to keep off the DX bands during the contests.

The new rules of the contest certainly appeared to reduce the QRM in the U.S.A., but what the Americans forgot was that Australia has a very big proportion of active stations and the nett result was that there was an enormous amount of useless calling and QRM in VK, simply because the W's could not QSO more than three stations per band per prefix.

WESTERN DISTRICT NOTES.

By 3HG.

3PG now has his mast re-erected and the beam antenna again in place, and is working DX galore with his usual low power. He has been trying ten metres, but no luck so far.

3OW away on annual vacation. 3HG now using lower power, the supply being a 180-volt genemotor, and it gets out surprisingly well considering the input.

3HL intends building new rig for 20 and 10 metres. Has had some success on ten. Conditions on this band do not seem as good in this dis-

trict as in the city, but it may be our receivers that are at fault. 3KR, however, seems in a better location, as he worked five continents during his first 24 hours on ten! 3OR seems to spend most of his time travelling to and from the city and, owing to having a new home built, is on the air very little.

3KX working his usual DX on 40, 20 and 10, but he did not hear ZSIH calling him on 10 the other evening! 3BQ, after waiting over two years for a card from HC1FG for his WAC certificate, got tired of the long QRX, so worked an LU to double his chances of a QSL.

South Australian Division

By VK5KL.

Things are starting to happen now at the Institute meetings, and 1936 promises to be the most successful year for some time. The social side has been gone into and now supper is provided after every meeting. This is greatly appreciated by all attending.

Transmitters' Meeting, 26th February. One minute silence was taken in memory of the late Hiram P. Maxim, whose key is now silent. Mr. A. Richardson gave a lecture on "Neon Signs." Two committees were formed, one to conduct a dance in aid of "Miss Radio" Centenary contestant, and also for a stunt at Murray Bridge over Easter holidays. Have hopes of an article for "A.R.", so keep your eyes out for it, Mr. Editor. Now for scandal.

The most outstanding performance is the work of VK5ZC, VK5LJ and VK5IH, who obtained their WAC on ten on Sunday, 8th March, which was a paradise on the day mentioned. 5ZC beat 5LJ by half an hour for first VK5. F. B. Morrie, VK5IH ex 3WL, has been after his WAC since 1927.

VK5ZC wanted Europe for WAC on Sunday. G es OK called him but auto grm blotted them out.

5KL qsoed ZSIH but couldn't raise Europe. Worked HJ3AJH twice next morning to make up. Hi!

5WK was called by the HJ, but his rx. on about 15 mx. Bad luck, Nobby.

5PN, 5XJ, and 5DU have all joined the Institute. FB, om's. Let's hear from you.

5WW has a new mo' bike, but lacking a YL. How about trying to QSO "Miss Radio", Bill?

5LB worked an LU'9 for his WAC on 20 mx. Still BCL.

5RX, 5ZX, 5LD, 5KL, all did well in Junior Beru.

5WR's 800 is perking. F.B. not even a blush.

5AP uses filament of a 250 for aerial ammeter. Says he gets an amp. in sky. Who believes him?

5JC consoled with 3JJ and so crashed off his mo' bike, but back on air again now. Heard working his first LU. How do they do it?

Activity on the five-metre band is increasing, and many hams are active. Five-metre gear has been installed at 5WI and some FB work done. Hams active now are VK5HD, 5BD, 5RT, 5ZX, 5ZC and 5GP. 5LD has a transceiver nearly built, but can't scrounge a 19ft. HI! Heard that 5GF wants someone to test with, and 5XJ and 5GL have receivers.

Well, cheerio, for now, lads. Must see about some more Dx.

Western Australia Division

By Jack Meed, 6LJ.

Just the other night the general meeting of the Sandgropers was held, and a good muster attended. All the boys are very elated about the recent triumph of 6SA on gaining WAC, more details of which appear elsewhere. He is the first WAC in VK6, and well deserves it, as he has been a regular sticker at the game. 6MN is another who is very patient and still sits on 28 m.c. waiting for his turn! 6CP has left the ham game alone for some time, as he finds many willing mouths to feed and no money to buy any willing valves. I might mention that the willing mouths are male and female chooks, I mean, fowls, and NOT a huge family! 6CP has been heard on a little bit with fone (?), and could be on a bit more, but for the grim caused by gobble! gobble!! and squawks, etc. Clarrie will publish an article on "Fowls and their behaviour as appertained to radio." Might be the "pst", "pst" of the hens that keep off the air!

And now we have 6CX. Charlie is qrl (nobody knows), but he is reputed

to be very busy, and I haven't seen him for some time.

6AE is heard very often, but, Jack, how about those birdies in that signal? Twit, twit, twit, tweet, is made for a letter V, and it is jolly annoying! What! 6BB is busy on his model T. All the boys are wondering when Jack is going to fit AVC and a tuning meter to the Ford! 6BN has been here and been there, but we don't HEAR anything of him. Bert threatened to annoy some elections about three years ago, but the newness has gone off and he has returned to his hens! (Sounds like a harem.) Hee! Hee!! 6CA very little time and may reburat into bud any time on 56 m.c. or perhaps even 7 m.c.

6CY and 6CA may continue their messing around on that band, very seldom heard of as 56 m.c., but CY will return to 28 shortly.

6CB—hush! There is a mystery about Cliff. We believe that he has started out in business (no—not radio) on his own. Well, good luck, Cliff, and don't forget that radio has still a vacancy for you (might squeeze in on 7 m.c.—hi!) 6DA—no, not alive—was thinking of rebuilding and coming on the air, but the depression hit the world (How nasty, hi!)

6FG struts around the local village and eyes everything, but does not seem to increase the electricity and gas consumption. 6FL on 14 m.c., and can be heard qsoing the usual gang of Dx.

HB9AT has been coming through on this band about R8 lately and on 7 m.c. 6G6J has been good—those two chappies seem the most consistent. 6FO is another who can be heard just about any time of the day on some band, and must have a great total in his Dx list now. He had a good total in the Beru contests this year, but not so good as last year.

6FM has not been heard since his transfer to the greater southern West Australia. Guess his M.L. Converter is having a hard-earned rest, as it has been in use about eight years. 6GM is at present suffering a great discomfort in hospital, but when he reads this, we all hope he will be 100 per cent, again and dashing around on 80X again.

6GS was seen in town during the early part of March, and will be up here again shortly. Will be on the air shortly and annoy the lads. 6GW

—oh, George has been transferred, so we won't hear him for a little while.

6JE heard on the other day calling frantically the world, but seemed NBG. Jim has been on 14 m.c., and has been used generally, although not satisfied as much as he could wish, and wants the world to rush him! 6KR is another goldfields ham, but has "been taken for a ride," I think, as we never hear him on the air.

6JK promised to get back—into bed—not on the air, and the boys are going to buy a plug of TNT or summat to energeise him! 6JS on holidays. 6KZ on the air quite a lot and is the Port's only representative, except 6HW. Harry, of 6HW, has been heard during the day, but his work keeps him off during the night. Charlie, 6KZ, totalled another massive list in Beru, and is well in the running. Good luck, om! 6KB has a very nice sig. and works quite a bit of Dx on 7 m.c. Val has not exploited the other bands much yet, but will adjourn down there later.

6NL has been taken from VK6 and placed in V81 on a service job; another relation will carry on the work shortly and we wish HER good luck and hope to hear our first YL op. on soon. Also to Vic, we all extend the hand of good wishes, and trust that he does vy fb.

6NO has re-entered his shell—must be missing his second op! 6MO heard all day and night with about $\frac{1}{2}$ k.w.—must be as he is about R50 down here when our skip doesn't operate.

6MN is qrl at present on revamping a bit of gear and listening on ten. 6LJ darn busy, and is putting in new line-up of tubes in tx. 6LY startles us by explaining that he is going to return to the Purgatory of Hamdom. Oh, yeah? 6LK is not heard on the air—except from 6 a.m. B/C station minor was on ten a few days, but not since then. 6WS is good-oh, and is putting up brand new antenna system, after hearing lecture by VK2IC. 6WH has been pretty qsl on 7 and 14, but has revamped his gear and has a much better note. (About time, hi!)

6WI is on quite regularly with 6RI. as op., and has qsoed quite a few stations since its re-opening. Thanks to the boys. Messrs. Smith, Morrissey and Wignell all have their noses down to the grindstone and swotting like

mad in order to get on the air. Good luck, gang, and keep at it.

Tasmanian Division

By 7PA.

The monthly meeting for March was held as usual on the first Tuesday, 3rd instant, with the usual few attending. Owing to short notice from the intended lecturer, there was no lecture given and a general chat was carried on instead, quite a mothers' meeting.

During the meeting some discussion was given to the problem of answering reports on 200-metre 'phone, which has recently been ruled out. This arose out of controversial criticism that has been given, but circumstances require that this rule be carried out.

The council met on the 10th instant and usual business, also with 200-metre permits and a couple of members' applications were dealt with. Some 200-metre operators still persist in being late with their applications for 200-metre permits; they will moan when no permits are forthcoming. The State field finally fell through, so a local run was arranged for the 1st of March, and was a huge success, although the weather was not too good and a cold wind prevailed.

The transmitter party—7JH, the Hon. Secretary and friends—made a 100 per cent. job of the hiding, even ran the aerial through low trees, although they claim it was only because there were no trees convenient elsewhere to which to attach it. Oh, yeah! The worst part was that its contact with the moving branches caused the sig. to swing badly at times.

7PA and party were first in, and it took a quarter of an hour to actually unearth the 'mitter after having to leave the car. The location was about 400 yards from the road across paddocks. Messrs. Oldham and Lovett (7HL) were close on 7PA's heels by the time the find was actually made, and others followed on in fairly close order.

The hunt over, all removed to Ralph's Bay for lunch and an afternoon's sport. Some seining was indulged in, but the fish proved to be too wise for the fishermen—must have heard the 'mitter earlier, hi!

The Flying Error and crew paid VK7 a visit in February, and its presence caused quite a stir—it was even mistaken for an ambulance, hi! Must have been the bunks.

The crew, 5FBX, 2DQ and friend, made quite an extensive trip around this island, and visited most of the lads enroute, who were very pleased to make their acquaintance. The travel must have been too much for their gear, as they were not heard on the air while here.

The glamour has gone from the three-letter call now, Frank—VK2 has apparently exhausted its two-letter alphabet.

Spend a week-end at Chummie's shack at Ralph's Bay and get some fine sport fishing, but don't try it in the daytime, the fish are too wise; ask the field-day gang.

Who turned back on the threshold of success at the field day — Alan, not you? Too bad! Have to get an O.P. meter, like Chas.

Who taught young Happy to talk?

Seen at 7JB's—a 200-amp., quick-break, knife switch. Says it's in his modulation circuit. Poor old 800's. Sure it's not the main power switch, Jack!

W/VE contest going full swing—four minutes per contact seems to be 7JB's average so far; has worked 40, 20 and 10 metres, too. No wonder it's tough for the rest of the gang, hi!

7PA interested in contest; been very QRL with new receiver of the S.S. Super variety; has it perking fb now, but snagged on an earthed variable's rotor for quite a while before finding it. 7KV and 7JH also doing test, but no news available at present. Better have a night off, Buck, and give the boys a chance.

Rescued—A roundabout on Regatta Day, after its organ broke down—no good, no grind. For details see Roland, alias Mickie, speech amplifier expert.

Shock tactics—playing round a 'mitter with the juice on.

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28 and 56 M.C, Section IMPROVED CONDITIONS.

(By VK2BX.)

Conditions on 28 M.C. were very quiet towards the end of February, but they have shown a steady improvement since the beginning of March. At present the band is wide open, and signals from all continents come through for hours on end.

On the 8th of March, ZS1H and OAAJ through very well, and seemed to work a continuous stream of VK3's. The VIM gang seems to grab all the 28 M.C. D.X.! VK3BD puts out the best signal, and can be heard here at almost any hour of the day or early evening regardless of conditions. He is usually only R1/2, but when conditions are O.K. for interstate work he just pounds through.

It apparently takes a D.X. Contest to get the ZL's down on ten, as I had not heard one for months. Now that the W/VE D.X. Contest has started, ZL1AB and ZL2KI come through at R7, and I could hear the Yanks calling others. QRM is getting a real problem on ten now, and the top of the band is just a mass of stations piled one on top of the other.

VK2EO has moved to a new QRA at Chatswood, which is much better for D.X., and he has now W.A.C. on 28 M.C. by working HJ3AJH. In Sydney the gang is growing, and 2UC, 2AE and 2JT are putting out nice T9X signals. 2FG is another addition who is using S.E. and putting out a very solid T6 signal. 2JT is really an old-timer, as he used to be on 10 M.X. several years ago, when conditions were poor. Another old 10 M.X. station (2XY) is showing signs of life again also. Syd. has built a new super-het. receiver, and threatens to put a transmitter on the air soon.

A message from FA8BG via ZL3JR states that the former wants VK and ZL stations to keep a lookout for him daily at 18.00 GMT on 28 M.C. There should be a good chance of signals from Europe breaking through at that time, and several of the locals have been looking for them.

Good signals have been heard from the following D.X. stations during March: — ZS1H, HJ3AJH, OAAJ, OH3NP, K6NJV, K6CRU, several J's and many W's.

Federal Headquarters Notes

Now that the Federal Convention, held in Queensland, has been concluded, there is quite a large amount of work before the Federal Executive. This Convention was a huge success, both as a Convention and the work done, and also as regards the good time given visiting delegates by the members of the Queensland Division of the W.L.A.

The Convention itself was opened by Mr. E. T. Fisk from the Sydney studio of 2CH, who, in conjunction with 4BC, made a two-way broadcast between the capital cities possible. This broadcast officially declared the Convention open at 8 p.m. on Saturday, and sessions were held until all matters had been dealt with, concluding late on Sunday night. A complete report of these sessions appears elsewhere.

BERU CONTEST.—The senior and junior tests are now both over, and both were very well supported by VK hams. In Australia, VK3EG was the star performer in the senior Beru, and with a score of over 900 points should clean up the whole Empire. Most VK's thought they were doing very well to score 600 points, but 900 points—well, that's that.

ARRL CONTEST.—The ARRL contest has just begun, and, judging by the way 28 M.C. and 14 M.C. bands are behaving, some high scores are likely. Several VK's should almost clean up all the zones on 28 M.C., 14 M.C. and 7 M.C., which will give a very nice multiplier.

FISK TROPHY CONTEST.—The next Fisk Trophy Contest has tentatively been set down for next August. Details have not yet been finalised, and the Federal Executive would be pleased to have your ideas on what type of contest you would prefer. So write now.

VK D.X. CONTEST.—The next D.X. Contest will be held in October, and this year F.H.Q. has granted VK5 permission to run one this year, to commemorate their centenary. Details are not yet available, but get ready.

W.A.C. CERTIFICATES.—W.A.C. Certificate applications continue to roll in, and are becoming too numerous to mention in these columns. However, don't forget the special W.A.C. 10-Metre Certificates. It looks

like VK4AP has first claims on the first VK W.A.C. ten, but time (and cards) will tell.

THE SECOND VK3 DIVISION 5-METRE FIELD DAY.

The success of the first 56 m.c. field day left no doubt in the organisers' minds that a second must be staged. The three or four contests held during the year helped to upset the plans for the second event, but now that the air is clear for some months ahead, and bearing in mind the closeness of old man winter, it was decided to name a date for the big event. It is to be held on April 26.

This gives us plenty of time to wire up portable transmitters and receivers. In addition to those who took part last time, it is hoped to have a large number of new entrants for the fun.

The same procedure will be followed again this time. Members can choose their particular locations around the country up to 100 miles from Melbourne. Contacts over 100 miles are expected with ease. During the first field day the record was 83 miles. Stations used power as low as 1 watt and all made a noise never less than R7-8. So, bear that in mind: power is only a secondary consideration. Attention should be paid to well-designed arrays for results. "Amateur Radio" has published various articles on antennae for this band, and these should be referred to before deciding on the antenna. A small super-regenerative receiver such as described by VK3ML in an article published in the August, 1935, issue, would be all that is required for receiving.

As we are anxious to find out who will participate early, will all those interested and who would like to join in the fun, please communicate with VK3ZC or VK3ML immediately?

COUNCIL N.S.W. DIVISION, 1936-37.

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Bug Hunting on 28 M.C.

By I. Patterson (VK3YP).

Practically every amateur has tried to get a receiver working on 28 M.C. at some time during his experience. The purpose of this article is to try to help the ham who failed to get satisfactory results in this attempt.

The T.R.F. type of receiver is the best from an economical standpoint. It should consist of three valves of the V.V.V. combination, two R.F. stages having been tried and found of little use on this band. Of the 2.5 volt series, the types 58, 57 and 56, and for 6 volt the 6D6, 6C6 and 42 tubes provide suitable combination. For the R.F. and detector grid coils, about four turns of 20 DSC on $1\frac{1}{4}$ -inch formers and spaced over $1\frac{1}{4}$ inches should land one in the band with about 20 degrees of the band setting condenser in. The most satisfactory way of obtaining good band spread is to use five pin coil formers. One separate pin is connected across one or two turns up from the earth end of the coil, and from this pin to the small ganged band-separating condenser, to which is affixed the main vernier tuning control. The two grid coils should be wound with an identical amount of wire, and the band-spreading tap taken from the same point on both coils, in order that the two circuits will track over their entire tuning range. Should, however, this not take place, a minor adjustment of the band-setting condensers will bring these circuits into resonance again. The antenna coil may be of any number of turns which best suits the antenna in use, but should not be too tightly coupled. Using this antenna coil as part of a link circuit coupling the R.F. grid circuit to a four-turn tuned aerial coil, with its centre earthed and the antenna feeder or feeders clipped on this coil until the impedance is matched to the best advantage, is a sure way of boosting signals one or two points and reducing the ignition QRM at the same time. This adjustment is not at all critical, and is well worth while.

Interlocking will be caused if the R.F. plate coil is too tightly coupled

to the detector grid coil. It is best to use maximum coupling at first, and then move the coil back until the interlocking just ceases. Care must be taken here to see that the plate coil does not exactly resonate on the band, as it will cause dead-spotting. For this reason it is better to use six or seven turns well away from the grid coil rather than three or four closer in. The cathode tap on the E.C. detector grid coil should be connected about a turn up from the earth end, but if this does not give an easy slide into oscillation, moving the tap up to one and a half turns should take care of this.

If a super-het. is being used, all the above hints apply with the exception of the R.F. plate coil spacing. In the super this coil should be interwound with the detector grid coil, and as many turns as possible should be used without causing interlocking taking place.

One big trouble that is usually found in both these types of receivers is that, unless plenty of by-pass condensers are used, it will be found impossible to get a T9 signal response. The salient points to be considered are the condensers between the heaters and earth, 25 m.f.d. low-voltage condensers used between one side of the heaters and earth should cure this trouble, but in cases where extreme difficulty is encountered, moving this condenser from socket to socket until the most satisfactory point is located should provide a solution to the problem.

The use of more than 250 volts on the plates is not recommended. With voltages of this order plate decoupling can be accomplished by the use of 10,000 ohm resistances, by-passed by about 1 m.f.d. Higher voltage will only increase the noise level, and lower voltages may be more effectively de-coupled without loss of voltage by the use of R.F. chokes, suitably by-passed to earth.

(Continued on Page 28)

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Many W.A.C.'s on Ten

(By VK3JJ.)

The best peak of 28 M.C. conditions that we have yet experienced seemed to extend to all States, and several stations worked all continents. HJ3AJH was the most popular South American, and his R.A.C. signals often reached R7/8. He was usually audible from 9 a.m. till 5 p.m., and could copy practically any V.K. on 10. OA4J put in an appearance one weekend and worked several VK3's, but his signals were not nearly as strong as the HJ. LU9AX was just audible around 8.30 a.m., but did not seem to work any VK's. The best of the Africans was ZS1H, who could work VK's for several hours on end each Sunday. ZS2A, ZU1C and ZE1JU also had a number of VK contacts, and the latter seemed to peak in strength after 7 p.m., when the others had faded.

Signals from North America pounded through by the dozen every morning between 8 a.m. and 1 p.m., many of the W's reaching R8/9 at times. Several VE's were also heard, and VE5BI seemed to have the most VK contacts. J3FK and J3DC were the most consistent from Asia, and could be worked practically any time during the day. Europe was rather hard to work from Victoria, but stations in the north and west appeared to have no difficulty with them.

Congratulations are extended to VK6SA for gaining what is believed to be the first W.A.C. in W.A. on any band. He was on night shift at the time, and happened to get up earlier on 7th March. Putting on the cans, he was surprised to hear HJ3AJH. Q4, R4, calling test. Springing to action, he called the HJ, who came back to VK3YP. After listening to the qso he called again, and this time raised him, making W.A.C. after being on the air over ten years. When the news went around several other VK6's returned to 28 M.C., and on the following day 6FO, 6MN and 6LJ put good signals through to Victoria. Other D.X. worked by 6SA included several W's and G's, F8CT, F8KJ,

YM4AA, OH7ND, D4CSA, D4GWF and SU1JT. OA4J has been heard by him.

Several 28 M.C. W.A.C's. have now been made in Victoria, and now 3BQ, 3BD, 3YP, 3CP, 3KX, 3BW and 3JJ have all managed it. 3YP and 3BD still seem to get most of the D.X., and the latter has had contacts with four of the Africans. 3KX has been very inactive on 28 M.C. lately, due to fishing trips. It was just by a stroke of luck that he was active on 8th March, when all continents could be heard QSA5. Contacts were made with several W's, VE4PH, VE5BI, HJ3AJH, ZS1H and ZS2A, the last two giving an R7 report. 3JJ spent a month in hospital, due to injuries received in an accident, but the first few days on the air in March brought contacts with HJ, OA and ZS1H, getting an R8 report from the latter. Listening on the 56 M.C. band one afternoon, the harmonic of VK4EI, working on 28 M.C., was audible. There was very little fading, and the strength reached R5. The conditions for VK3/4 contacts must have been exceptional at the time, and, no doubt, would be the most likely time to try and contact on 56 M.C.

The latest reports from U.S.A. indicate that 56 M.C. signals occasionally travelled over 1,000 or so miles during their past summer, apparently on a reflected wave. Interest in local 'phone work on the 56 M.C. band does not seem to attract much attention from VK's, so why not give higher-powered CW a trial? The best times for these contacts would probably be when the 28 M.C. band is particularly good between interstate stations.

The winner of the International 23 M.C. Contest held last year by the R.S.G.B. was X1AY, with 4,542 points; second, VK2LZ, 4,017; and third, W4AJY, 2,399 points.

(Continued from page 25)

HAMADS

For the purest signals with indirectly heated tubes, the filament voltage will be found quite critical. Experimentation with the primary tap on the transformer will cover this. Large by-pass condensers from the screen grids to earth will help in reducing interlocking effects. Suppressors should be preferably tied to the cathodes, and the latter, in all R.F. circuits, by-passed with mica condensers.

The use of shielded wire for the plate and grid leads in the I.F. stages is essential for preventing oscillation when high gain is used. The use of grid decoupling should not be necessary if the shielding is properly carried out.

Attention to these details should enable any ham to get his receiver working properly, and his next difficulty will be to locate the band. After roughly locating it with a harmonic from the transmitter, the commercial harmonics that are likely to be heard are TDC, JNJ, XOB, WIZ, WQT, JUM and TDH, in that order down in frequency from 28,000 k.c.

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